

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**Inventor:** William J. ALLEN et al.**Serial No.:** Not Yet Known**Group Art Unit:** Not Yet Known**Filed:** Herewith**Examiner:** Not Yet Known**Title:** DYNAMIC GENERATION OF LINEARIZED HALFTONE
MATRIXBOX NON-FEE AMENDMENT
Assistant Commissioner for Patents
Washington, D.C. 20231**PRELIMINARY AMENDMENT**

Prior to the examination of the above application, please amend this application as follows:

IN THE CLAIMS:

In accordance with 37 C.F.R. § 1.121(c)(3), please delete Claim 2, amend Claims 3-11, and add new Claims 12-27. The amendments to the claims are explicitly shown in the attached "Version With Markings To Show Changes Made."

Please amend claims 3-11 as follows:

3. (Amended) A method of generating halftone matrix data having a predetermined response of number of dots printed as a function of digital input value, said method comprising the steps of:

storing data describing a plurality of data elements as a plurality of vector entries, each said vector entry comprising an index number corresponding to a higher bit content per element halftone threshold level, an X coordinate data corresponding to a position in a first dimension, and a Y coordinate data corresponding to a position of said entry in a second dimension, said X and Y coordinate data positioning said index number in a two dimensional plane;

storing a tone correction data as a list of numbers;

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sequencing through said list of numbers and for each said number of said list, assigning a halftone threshold level to a corresponding number of said vector entries, wherein for each said number of said list, a different said halftone threshold value is assigned; and generating a lower bit content per element two dimensional halftone threshold level matrix from said plurality of vector entries and their corresponding respective assigned halftone threshold levels.

4. (Amended) The method according to claim 3, wherein said step of generating a two dimensional halftone threshold level matrix further comprises:

for each said vector data entry, storing a threshold level data assigned to said index value in a position within said two dimensional halftone threshold level matrix corresponding to said X and Y coordinates of said vector data entry.

5. (Amended) A method of generating halftone threshold data for an image printing system, said method comprising the steps of:

storing a higher bit content threshold level data, comprising a plurality of individual threshold level elements;

converting said higher bit content threshold level data into at least one level vector, said level vector comprising a plurality of vector data entries each of an index value number representing a high bit content level value of a halftone threshold level value, and a corresponding coordinate of said threshold level value;

applying a tone correction function by specifying a number of said vector data entries to be selected;

selecting said number of vector data entries from said plurality of vector data entries in said level vector, said selected plurality of vector data entries having highest index numbers, corresponding to highest threshold level numbers of said plurality of vector data entries; and

transforming said plurality of selected vector data entries into a lower bit content two dimensional threshold data.

6. (Amended) The method according to claim 5, wherein said high bit content threshold level data comprises a matrix having 16 bits per element.

7. (Amended) The method according to claim 5, wherein said low bit content threshold data comprises a plurality of elements each having 8 bits per element.

8. (Amended) The method according to claim 5, wherein said high bit content threshold level data further comprises a plurality of two-dimensional planes, wherein a plane of said plurality of two-dimensional planes is provided per each color of an image to be printed.

9. (Amended) A method of applying a correction to image data to correct for a printer response characteristic; said method comprising the steps of:

generating a correction characteristic to correct for said printer response characteristic, wherein said printer response characteristic is based on a response characteristic of a printer device;

applying said correction characteristic to a relatively high bit content half tone matrix data, to obtain a relatively low bit content half tone matrix data corrected for said printer response characteristic; and

processing said image data using said relatively low bit content half tone matrix data.

10. (Amended) The method according to claim 9, wherein said step of generating a correction characteristic is carried out automatically by said printer device.

11. (Amended) The method according to claim 10, wherein said correction characteristic is generated dynamically, and applied to said relatively high bit content half tone matrix in vector format.

Please add the following new claims:

12. (Newly Added) A computer readable storage medium on which is embedded one or more computer programs, said one or more computer programs implementing a method of generating halftone threshold matrix data for an image printer, said one or more computer programs comprising a set of instructions for:

taking a stored high bit content halftone matrix data; and

reducing said high bit content halftone matrix data to a relatively lower bit content halftone matrix data, within said image printer, wherein said step of reduction comprises incorporating a printer response correction function into said relatively low bit content halftone matrix data.

13. (Newly Added) A computer readable storage medium on which is embedded one or more computer programs, said one or more computer programs implementing a method of generating halftone matrix data having a predetermined response of number of dots printed as a function of digital input value, said one or more computer programs comprising a set of instructions for:

storing data describing a plurality of data elements as a plurality of vector entries, each said vector entry comprising an index number corresponding to a higher bit content per element halftone threshold level, an X coordinate data corresponding to a position in a first dimension, and a Y coordinate data corresponding to a position of said entry in a second dimension, said X and Y coordinate data positioning said index number in a two dimensional plane;

storing a tone correction data as a list of numbers;

sequencing through said list of numbers and for each said number of said list, assigning a halftone threshold level to a corresponding number of said vector entries, wherein for each said number of said list, a different said halftone threshold value is assigned; and

generating a lower bit content per element two dimensional halftone threshold level matrix from said plurality of vector entries and their corresponding respective assigned halftone threshold levels.

14. (Newly Added) The computer readable storage medium according to claim 12, wherein said set of instructions for generating a two dimensional halftone threshold level matrix further comprises:

for each said vector data entry, storing a threshold level data assigned to said index value in a position within said two dimensional halftone threshold level matrix corresponding to said X and Y coordinates of said vector data entry.

15. (Newly Added) A computer readable storage medium on which is embedded one or more computer programs, said one or more computer programs implementing a method of

generating halftone threshold data for an image printing system, said one or more computer programs comprising a set of instructions for:

storing a higher bit content threshold level data, comprising a plurality of individual threshold level elements;

converting said higher bit content threshold level data into at least one level vector, said level vector comprising a plurality of vector data entries each of an index value number representing a high bit content level value of a halftone threshold level value, and a corresponding coordinate of said threshold level value;

applying a tone correction function by specifying a number of said vector data entries to be selected;

selecting said number of vector data entries from said plurality of vector data entries in said level vector, said selected plurality of vector data entries having highest index numbers, corresponding to highest threshold level numbers of said plurality of vector data entries; and

transforming said plurality of selected vector data entries into a lower bit content two dimensional threshold data.

16. (Newly Added) The computer readable storage medium according to claim 14, wherein said set of instructions for high bit content threshold level data comprises a matrix having 16 bits per element.

17. (Newly Added) The computer readable storage medium according to claim 4, wherein said set of instructions for low bit content threshold data comprises a plurality of elements each having 8 bits per element.

18. (Newly Added) The computer readable storage medium according to claim 14, wherein said set of instructions for high bit content threshold level data further comprises a plurality of two-dimensional planes, wherein a plane of said plurality of two-dimensional planes is provided per each color of an image to be printed.

19. (Newly Added) A computer readable storage medium on which is embedded one or more computer programs, said one or more computer programs implementing a method of

applying a correction to image data to correct for a printer response characteristic; said one or more computer programs comprising a set of instructions for:

generating a correction characteristic to correct for said printer response characteristic, wherein said printer response characteristic is based on a response characteristic of a printer device;

applying said correction characteristic to a relatively high bit content half tone matrix data, to obtain a relatively low bit content half tone matrix data corrected for said printer response characteristic; and

processing said image data using said relatively low bit content half tone matrix data.

20. (Newly Added) The computer readable storage medium according to claim 18, wherein said set of instructions for generating a correction characteristic is carried out automatically by said printer device.

21. (Newly Added) The computer readable storage medium according to claim 19, wherein said set of instructions for correction characteristic is generated dynamically, and applied to said relatively high bit content half tone matrix in vector format.

22. (Newly Added) An image printer system configured to generate a linearized halftone matrix for a printer, said printer system comprising:

a linearisation function;

a high bit half-tone matrix; and

a processor configured to compile a linearized half-tone matrix based on said linearisation function and said high bit half-tone matrix.

23. (Newly Added) The system according to claim 21, further comprising:

a target response; and

an actual response, wherein said processor is further configured to calculate said linearisation function based on said target response and said actual response.

24. (Newly Added) The system according to claim 22, wherein said printer is configured to print a calibration patch.

25. (Newly Added) The system according to claim 23, wherein said processor is further configured to determine said actual response based on said calibration patch.

26. (Newly Added) The system according to claim 21, wherein said printer is further configured to print an image based on said linearized half-tone matrix and data associated with an image.

27. (Newly Added) An image printer configured to generate a halftone threshold matrix data, said printer comprising:

a means for taking a stored high bit content halftone matrix data; and

a means for reducing said high bit content halftone matrix data to a relatively lower bit content halftone matrix data, within said printer, wherein said step of reduction comprises incorporating a printer response correction function into said relatively low bit content halftone matrix data.

REMARKS

The examiner is respectfully requested to consider this preliminary amendment prior to examination of the application. Claims 3-11 have now been amended to correct editorial errors and clear up any matters of form, Claim 2 has been deleted and Claims 12-27 have been added. In this regard, the amendments and additions to the claims are not related to patentability. Entry of the foregoing amendment is respectfully requested. No new matter has been introduced.

Attached hereto is a marked-up version of the changes made to the claims by the current amendment. The attached page is captioned **Version with markings to show changes made.**

Applicant respectfully requests that a timely Notice of Allowance be issued in this case. Should the Examiner believe that a telephone conference with the undersigned would

assist in resolving any issues pertaining to the allowability of the above-identified application, please contact the undersigned at the telephone number listed below.

Respectfully submitted,

WILMER, CUTLER & PICKERING

Dated:

July 27, 2001

John W. Ryan
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2445 M Street, NW
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202-663-6446
202-663-6363 (facsimile)

Version with markings to show changes made

Please amend claims 3-11 as follows:

3. (Amended) A method of generating [a] halftone matrix data having a predetermined response of number of dots printed as a function of digital input value, said method [characterized by] comprising the steps of:

storing data describing a plurality of data elements as a plurality of vector entries, each said vector entry comprising an index number corresponding to a higher bit content per element halftone threshold level, an X coordinate data corresponding to a position in a first dimension, and a Y coordinate data corresponding to a position of said entry in a second dimension, said X and Y coordinate data positioning said index number in a two dimensional plane;

storing a tone correction data as a list of numbers [(401)];

sequencing through said list of numbers [(1001)] and for each said number of said list, assigning a halftone threshold level to a corresponding number of said vector entries, wherein for each said number of said list, a different said halftone threshold value is assigned; and

generating [(504)] a lower bit content per element two dimensional halftone threshold level matrix [(402)] from said plurality of vector entries and their corresponding respective assigned halftone threshold levels.

4. (Amended) The method [as claimed in] according to claim 3, [characterized in that] wherein said step of generating a two dimensional halftone threshold level matrix further comprises:

for each said vector data entry, storing a threshold level data assigned to said index value in a position within said two dimensional halftone threshold level matrix corresponding to said X and Y coordinates of said vector data entry.

5. (Amended) A method of generating halftone threshold data for an image printing system, said method [characterized by] comprising the steps of:

storing a higher bit content threshold level data [(600)], comprising a plurality of individual threshold level elements;

converting [(500)] said higher bit content threshold level data into at least one level vector, said level vector [(400)] comprising a plurality of vector data entries each of an index value number representing a high bit content level value of a halftone threshold level value, and a corresponding coordinate of said threshold level value;

applying [(502)] a tone correction function by specifying a number of said vector data entries to be selected;

selecting said number of vector data entries from said plurality of vector data entries in said level vector, said selected plurality of vector data entries having highest index numbers, corresponding to highest threshold level numbers of said plurality of vector data entries; and

transforming [(504)] said plurality of selected vector data entries into a lower bit content two dimensional threshold data.

6. (Amended) The method [as claimed in] according to claim 5, wherein said high bit content threshold level data [(600)] comprises a matrix having 16 bits per element.

7. (Amended) The method [as claimed in] according to claim 5, wherein said low bit content threshold data [(402)] comprises a plurality of elements each having 8 bits per element.

8. (Amended) The method [as claimed in] according to claim 5, wherein said high bit content threshold level data further comprises a plurality of two-dimensional planes, wherein [one said plane] a plane of said plurality of two-dimensional planes is provided per each color of an image to be printed.

9. (Amended) A method of applying a correction to image data to correct for a printer response characteristic; said method comprising the steps of:

generating a correction characteristic to correct for [a response of said] said printer response characteristic, wherein said printer response characteristic is based on a response characteristic of a printer device;

applying said correction characteristic to a relatively high bit content half tone matrix data, to obtain a relatively low bit content half tone matrix data corrected for said printer response characteristic; and

processing said image data using said relatively low bit content half tone matrix data.

10. (Amended) The method [as claimed in] according to claim 9, wherein said step of generating a correction characteristic is carried out automatically by said printer device.

11. (Amended) The method [as claimed in] according to claim 10, wherein said correction characteristic is generated dynamically, and applied to said relatively high bit content half tone matrix in vector format.

Please add the following new claims:

12. (Newly Added) A computer readable storage medium on which is embedded one or more computer programs, said one or more computer programs implementing a method of generating halftone threshold matrix data for an image printer, said one or more computer programs comprising a set of instructions for:

taking a stored high bit content halftone matrix data; and

reducing said high bit content halftone matrix data to a relatively lower bit content halftone matrix data, within said image printer, wherein said step of reduction comprises incorporating a printer response correction function into said relatively low bit content halftone matrix data.

13. (Newly Added) A computer readable storage medium on which is embedded one or more computer programs, said one or more computer programs implementing a method of generating halftone matrix data having a predetermined response of number of dots printed as a function of digital input value, said one or more computer programs comprising a set of instructions for:

storing data describing a plurality of data elements as a plurality of vector entries, each said vector entry comprising an index number corresponding to a higher bit content per element halftone threshold level, an X coordinate data corresponding to a position in a first dimension, and a Y coordinate data corresponding to a position of said entry in a second dimension, said X and Y coordinate data positioning said index number in a two dimensional plane;

storing a tone correction data as a list of numbers;

sequencing through said list of numbers and for each said number of said list, assigning a halftone threshold level to a corresponding number of said vector entries, wherein for each said number of said list, a different said halftone threshold value is assigned; and

generating a lower bit content per element two dimensional halftone threshold level matrix from said plurality of vector entries and their corresponding respective assigned halftone threshold levels.

14. (Newly Added) The computer readable storage medium according to claim 12, wherein said set of instructions for generating a two dimensional halftone threshold level matrix further comprises:

for each said vector data entry, storing a threshold level data assigned to said index value in a position within said two dimensional halftone threshold level matrix corresponding to said X and Y coordinates of said vector data entry.

15. (Newly Added) A computer readable storage medium on which is embedded one or more computer programs, said one or more computer programs implementing a method of generating halftone threshold data for an image printing system, said one or more computer programs comprising a set of instructions for:

storing a higher bit content threshold level data, comprising a plurality of individual threshold level elements;

converting said higher bit content threshold level data into at least one level vector, said level vector comprising a plurality of vector data entries each of an index value number representing a high bit content level value of a halftone threshold level value, and a corresponding coordinate of said threshold level value;

applying a tone correction function by specifying a number of said vector data entries to be selected;

selecting said number of vector data entries from said plurality of vector data entries in said level vector, said selected plurality of vector data entries having highest index numbers, corresponding to highest threshold level numbers of said plurality of vector data entries; and

transforming said plurality of selected vector data entries into a lower bit content two dimensional threshold data.

16. (Newly Added) The computer readable storage medium according to claim 14, wherein said set of instructions for high bit content threshold level data comprises a matrix having 16 bits per element.

17. (Newly Added) The computer readable storage medium according to claim 4, wherein said set of instructions for low bit content threshold data comprises a plurality of elements each having 8 bits per element.

18. (Newly Added) The computer readable storage medium according to claim 14, wherein said set of instructions for high bit content threshold level data further comprises a plurality of two-dimensional planes, wherein a plane of said plurality of two-dimensional planes is provided per each color of an image to be printed.

19. (Newly Added) A computer readable storage medium on which is embedded one or more computer programs, said one or more computer programs implementing a method of applying a correction to image data to correct for a printer response characteristic; said one or more computer programs comprising a set of instructions for:

generating a correction characteristic to correct for said printer response characteristic, wherein said printer response characteristic is based on a response characteristic of a printer device;

applying said correction characteristic to a relatively high bit content half tone matrix data, to obtain a relatively low bit content half tone matrix data corrected for said printer response characteristic; and

processing said image data using said relatively low bit content half tone matrix data.

20. (Newly Added) The computer readable storage medium according to claim 18, wherein said set of instructions for generating a correction characteristic is carried out automatically by said printer device.

21. (Newly Added) The computer readable storage medium according to claim 19, wherein said set of instructions for correction characteristic is generated dynamically, and applied to said relatively high bit content half tone matrix in vector format.

22. (Newly Added) An image printer system configured to generate a linearized halftone matrix for a printer, said printer system comprising:

a linearisation function;

a high bit half-tone matrix; and

a processor configured to compile a linearized half-tone matrix based on said linearisation function and said high bit half-tone matrix.

23. (Newly Added) The system according to claim 21, further comprising:

a target response; and

an actual response, wherein said processor is further configured to calculate said linearisation function based on said target response and said actual response.

24. (Newly Added) The system according to claim 22, wherein said printer is configured to print a calibration patch.

25. (Newly Added) The system according to claim 23, wherein said processor is further configured to determine said actual response based on said calibration patch.

26. (Newly Added) The system according to claim 21, wherein said printer is further configured to print an image based on said linearized half-tone matrix and data associated with an image.

27. (Newly Added) An image printer configured to generate a halftone threshold matrix data, said printer comprising:

a means for taking a stored high bit content halftone matrix data; and

a means for reducing said high bit content halftone matrix data to a relatively lower bit content halftone matrix data, within said printer, wherein said step of reduction comprises incorporating a printer response correction function into said relatively low bit content halftone matrix data.